WHAT IS CLAIMED IS:

1. A measuring method of internal information of a scattering medium, comprising:

a light injecting step of injecting pulsed light of two or more predetermined wavelengths into a scattering medium at a light injection position;

a light detecting step of detecting the light of said two or more predetermined wavelengths having propagated inside said scattering medium, at a photodetection position to acquire a photodetection signal;

a signal processing step of acquiring waveform data indicating a temporal change of intensity of the detected light, based on said photodetection signal;

a mean pathlength and variance computing step of performing an operation to compute a mean pathlength of plural photons composing said detected light, and a variance, based on said waveform data; and

an absorption coefficient difference calculating step of calculating a difference between absorption coefficients at said predetermined wavelengths, based on a predetermined relation holding among said mean pathlength, said variance, and the difference between the absorption coefficients at said two or more predetermined wavelengths.

2. A measuring method of internal information of

a scattering medium according to Claim 1, wherein said absorption coefficient difference calculating step comprises a step of further calculating a concentration of an absorber, based on said difference between the absorption coefficients at said two or more predetermined wavelengths and a difference between extinction coefficients of the absorber thereat.

3. A measuring method of internal information of a scattering medium according to Claim 1, wherein said operation carried out in said mean pathlength and variance computing step is an operation executed using a mean pathlength and a variance of said photodetection signal and a mean pathlength and a variance of an instrumental function.

4. A measuring method of internal information of a scattering medium according to Claim 1, wherein said predetermined relation used in said absorption coefficient difference calculating step is a relation among said mean pathlength, said variance, and said difference between the absorption coefficients at said two or more predetermined wavelengths derived from the Microscopic Beer-Lambert law.

5. A measuring method of internal information of a scattering medium according to Claim 1, wherein said pulsed light used in said light injecting step is said pulsed light of said predetermined wavelengths of n + 1

kinds (where n is an integer not less than 1),

said photodetection signal detected in said light detecting step is said photodetection signals of n + 1 kinds,

said waveform data acquired in said signal processing step is said waveform data of n + 1 kinds,

said mean pathlength and said variance computed in said mean pathlength and variance computing step are said mean pathlengths and said variances of n + 1 kinds, and

said difference between the absorption coefficients calculated in said absorption coefficient difference calculating step is said differences of n kinds between the absorption coefficients at said predetermined wavelengths of n + 1 kinds.

6. A measuring method of internal information of a scattering medium according to Claim 5, wherein said absorption coefficient difference calculating step comprises a step of further calculating concentrations of absorbers of n kinds, based on said differences of n kinds between the absorption coefficients at said predetermined wavelengths of n + 1 kinds and differences between extinction coefficients of the absorbers of n kinds thereat.

7. A measuring method of internal information of a scattering medium, comprising:

a light injecting step of injecting modulated light of two or more predetermined wavelengths modulated at a predetermined frequency, into a scattering medium at a light injection position;

a light detecting step of detecting said light of said two or more predetermined wavelengths having propagated inside said scattering medium, at a photodetection position to acquire a photodetection signal;

a signal processing step of extracting a signal of said predetermined frequency component from said photodetection signal;

a group delay and second-partial-derivative-of-logarithm-of-amplitude computing step of computing a group delay of the signal of said predetermined frequency component and a second partial derivative of logarithm of amplitude with respect to the modulation frequency, based on said signal of the predetermined frequency component; and

an absorption coefficient difference calculating step of calculating a difference between absorption coefficients at said predetermined wavelengths, based on a predetermined relation holding among said group delay, said second partial derivative of logarithm of amplitude with respect to the modulation frequency, and the difference between the absorption coefficients at

said two or more predetermined wavelengths.

8. A measuring method of internal information of a scattering medium according to Claim 7, wherein said absorption coefficient difference calculating step comprises a step of further calculating a concentration of an absorber, based on said difference between the absorption coefficients at said two or more predetermined wavelengths and a difference between extinction coefficients of the absorber thereat.

9. A measuring method of internal information of a scattering medium according to Claim 7, wherein said predetermined relation used in said absorption coefficient difference calculating step is a relation among said group delay, said second partial derivative of logarithm of amplitude with respect to the modulation frequency, and the difference between the absorption coefficients at said two or more predetermined wavelengths derived from the Microscopic Beer-Lambert law.

10. A measuring method of internal information of a scattering medium according to Claim 7, wherein said modulated light used in said light injecting step is said modulated light of said predetermined wavelengths of n + 1 kinds (where n is an integer not less than 1),

said photodetection signal detected in said light

detecting step is said photodetection signals of n + 1 kinds,

said signal of the predetermined frequency component extracted in said signal processing step is said signals of predetermined frequency components of n + 1 kinds,

said group delay and said second partial derivative of logarithm of amplitude with respect to the modulation frequency computed in said group delay and second-partial-derivative-of-logarithm-of-amplitude computing step are said group delays and said second partial derivatives of logarithm of amplitude with respect to the modulation frequency of n + 1 kinds, and

said difference between the absorption coefficients calculated in said absorption coefficient difference calculating step is said differences of n kinds between the absorption coefficients at said predetermined wavelengths of n + 1 kinds.

11. A measuring method of internal information of a scattering medium according to Claim 10, wherein said absorption coefficient difference calculating step comprises a step of further calculating concentrations of absorbers of n kinds, based on said differences of n kinds between the absorption coefficients at said predetermined wavelengths of n + 1 kinds and differences between extinction coefficients of the

absorbers of n kinds thereat.

12. A measuring apparatus of internal information of a scattering medium, comprising:

light injecting means for injecting pulsed light of two or more predetermined wavelengths into a scattering medium at a light injection position;

light detecting means for detecting the light of said two or more predetermined wavelengths having propagated inside said scattering medium, at a photodetection position to acquire a photodetection signal;

signal processing means for acquiring waveform data indicating a temporal change of intensity of the detected light, based on said photodetection signal;

mean pathlength and variance computing means for performing an operation to compute a mean pathlength of plural photons composing said detected light, and a variance, based on said waveform data; and

absorption coefficient difference calculating means for calculating a difference between absorption coefficients at said predetermined wavelengths, based on a predetermined relation holding among said mean pathlength, said variance, and the difference between the absorption coefficients at said two or more predetermined wavelengths.

13. A measuring apparatus of internal

information of a scattering medium according to Claim 12, wherein said absorption coefficient difference calculating means further calculates a concentration of an absorber, based on said difference between the absorption coefficients at said two or more predetermined wavelengths and a difference between extinction coefficients of the absorber thereat.

14. A measuring apparatus of internal information of a scattering medium according to Claim 12, wherein said operation carried out by said mean pathlength and variance computing means is an operation executed using a mean pathlength and a variance of said photodetection signal and a mean pathlength and a variance of an instrumental function.

15. A measuring apparatus of internal information of a scattering medium according to Claim 12, wherein said predetermined relation used in said absorption coefficient difference calculating means is a relation among said mean pathlength, said variance, and said difference between the absorption coefficients at said two or more predetermined wavelengths derived from the Microscopic Beer-Lambert law.

16. A measuring apparatus of internal information of a scattering medium according to Claim 12, wherein said pulsed light used in said light injecting means is said pulsed light of said

predetermined wavelengths of n + 1 kinds (where n is an integer not less than 1),

said photodetection signal detected by said light detecting means is said photodetection signals of n + 1 kinds,

said waveform data acquired by said signal processing means is said waveform data of n + 1 kinds,

said mean pathlength and said variance computed by said mean pathlength and variance computing means are said mean pathlengths and said variances of n + 1 kinds, and

said difference between the absorption coefficients calculated by said absorption coefficient difference calculating means is said differences of n kinds between the absorption coefficients at said predetermined wavelengths of n + 1 kinds.

17. A measuring apparatus of internal information of a scattering medium according to Claim 16, wherein said absorption coefficient difference calculating means further calculates concentrations of absorbers of n kinds, based on said differences of n kinds between the absorption coefficients at said predetermined wavelengths of n + 1 kinds and differences between extinction coefficients of the absorbers of n kinds thereat.

18. A measuring apparatus of internal

information of a scattering medium, comprising:

light injecting means for injecting modulated light of two or more predetermined wavelengths modulated at a predetermined frequency, into a scattering medium at a light injection position;

light detecting means for detecting said light of said two or more predetermined wavelengths having propagated inside said scattering medium, at a photodetection position to acquire a photodetection signal;

signal processing means for extracting a signal of said predetermined frequency component from said photodetection signal;

group delay and second-partial-derivative-of-logarithm-of-amplitude computing means for computing a group delay of the signal of said predetermined frequency component and a second partial derivative of logarithm of amplitude with respect to the modulation frequency, based on said signal of the predetermined frequency component; and

absorption coefficient difference calculating means for calculating a difference between absorption coefficients at said predetermined wavelengths, based on a predetermined relation holding among said group delay, said second partial derivative of logarithm of amplitude with respect to the modulation frequency, and

the difference between the absorption coefficients at said two or more predetermined wavelengths.

19. A measuring apparatus of internal information of a scattering medium according to Claim 18, wherein said absorption coefficient difference calculating means further calculates a concentration of an absorber, based on said difference between the absorption coefficients at said two or more predetermined wavelengths and a difference between extinction coefficients of the absorber thereat.

20. A measuring apparatus of internal information of a scattering medium according to Claim 18, wherein said predetermined relation used in said absorption coefficient difference calculating means is a relation among said group delay, said second partial derivative of logarithm of amplitude with respect to the modulation frequency, and the difference between the absorption coefficients at said two or more predetermined wavelengths derived from the Microscopic Beer-Lambert law.

21. A measuring apparatus of internal information of a scattering medium according to Claim 18, wherein said modulated light used in said light injecting means is said modulated light of said predetermined wavelengths of n + 1 kinds (where n is an integer not less than 1),

said photodetection signal detected by said light detecting means is said photodetection signals of n + 1 kinds,

said signal of the predetermined frequency component extracted by said signal processing means is said signals of predetermined frequency components of n + 1 kinds,

said group delay and said second partial derivative of logarithm of amplitude with respect to the modulation frequency computed by said group delay and second-partial-derivative-of-logarithm-of-amplitude computing means are said group delays and said second partial derivatives of logarithm of amplitude with respect to the modulation frequency of n + 1 kinds, and

said difference between the absorption coefficients calculated by said absorption coefficient difference calculating means is said differences of n kinds between the absorption coefficients at said predetermined wavelengths of n + 1 kinds.

22. A measuring apparatus of internal information of a scattering medium according to Claim 21, wherein said absorption coefficient difference calculating means further calculates concentrations of absorbers of n kinds, based on said differences of n kinds between the absorption coefficients at said predetermined wavelengths of n + 1 kinds and

differences between extinction coefficients of the absorbers of n kinds thereat.